In the Claims

Please amend the claims of the Application as follows:

1. (Presently Amended) A method of autocalibrating a single-photon detector arranged to detect weak photon pulses in a quantum key distribution (QKD) system, comprising:

a) performing a detector gate scan by sending a detector gate pulse to the single-photon detector and varying an arrival time T of the detector ~~gating~~ gate pulse over a first select range R1 to determine an optimal arrival time T_{MAX} that corresponds to a maximum number of photon counts N_{MAX} from the single-photon detector; and

b) performing detector gate dithering of the detector gate pulse by varying the arrival time T over a second select range R2 surrounding T_{MAX} to maintain the photon count at a maximum value.

2. (Original) The method of claim 1, including:

terminating the detector gate dithering and performing another detector gate scan.

3. (Presently Amended) The method of claim 1, wherein the QKD system includes a programmable controller and a computer readable medium, and wherein the method is embodied in the computer readable medium and causes ~~such that~~ the controller ~~is capable of directing~~ to execute instructions that direct the QKD system to carry out acts a) and b).

4. (Original) The method of claim 1, wherein performing the detector gate scan includes varying a detector gate pulse width W over a range of pulse widths RW1 to establish an optimal detector gate pulse width W_{MAX}.

5. (Original) The method of claim 4, wherein performing detector gate dithering includes varying the detector gate pulse width W over a range of pulse widths RW2 < RW1 to maintain an optimal pulse width.

6. (Presently Amended) A computer-readable medium having instructions embodied therein to direct a computer in a quantum key distribution (QKD) system to execute instructions to perform the following method of performing autocalibration of a single-photon detector arranged to detect weak photon pulses in the QKD system:

a) ~~performing a detector gate scan by~~ sending a detector gate pulse to the single-photon detector and varying an arrival time T of the detector ~~gating~~ gate pulse over a first range R1 to determine an optimal arrival time T_{MAX} that corresponds to a maximum number of photon counts N_{MAX} from the single-photon detector; and

b) ~~performing detector gate~~ dithering the detector gate pulse by varying the arrival time T over a second select range R2 surrounding T_{MAX} to maintain the number of photon counts at a maximum value.

7. (Presently Amended) A method of ~~exchanging a key in a~~ operating a quantum key distribution (QKD) system having a single-photon detector operably coupled to a controller, comprising:

sending weak photon pulses between encoding stations in the QKD system;

performing a first detector gate scan by sending a detector gate pulse from the controller to the detector over a range of detector gate pulse arrival times T to establish a first optimal arrival time T_{MAX} corresponding to a first maximum number of photon counts N_{MAX} from the detector;

terminating the first detector gate scan when the first T_{MAX} is established; and

performing a first detector gate dither by altering the arrival time T over a range of arrival times R2 about the first T_{MAX} to maintain either the maximum number of photon counts N_{MAX} or a different maximum number of photon counts N'_{MAX} over the range R2.

8. (Original) The method of claim 7, wherein performing the detector gate dither results in a new optimal arrival time T'_{MAX}.

9. (Previously Amended) The method of claim 7, further including:

terminating the performing of a detector gate dither;

performing a second detector gate scan;

terminating the second detector gate scan; and

performing a second detector gate dither.

10. (Original) The method of claim 7, further including terminating and repeating the first detector gate dither periodically so as to perform a series of detector gate dithers.

11. (Presently Amended) A computer-readable medium having instructions embodied therein to direct a computer in a quantum key distribution (QKD) system to execute instructions to perform the following method ~~of performing autocalibration of a~~ of autocalibrating a single-photon detector arranged to detect photons in the QKD system:

sending weak photon pulses between encoding stations in the QKD system;

performing a first detector gate scan by sending a detector gate pulse from the controller to the detector over a range of detector gate pulse arrival times T to establish a first optimal arrival time T_{MAX} corresponding to a first maximum number of photon counts N_{MAX} from the detector;

terminating the first detector gate scan when the first T_{MAX} is established; and

performing a first detector gate dither by the controller altering the arrival time T over a range of arrival times R2 about the first T_{MAX} to maintain either the maximum number of photon counts N_{MAX} or a different maximum number of photon counts N'_{MAX} over the range R2.

12. (Original) A method of autocalibrating a single-photon detector in a quantum key distribution (QKD) system having a controller, comprising:

sending weak photon pulses between encoding stations in the QKD system;

performing a first detector gate scan to determine an optimum arrival time of a detector gate pulse sent from a controller to the detector;

terminating the first detector gate scan; and

periodically performing a first detector gate dither to maintain a maximum number of photon counts from the detector.

~~12~~ 13. (Presently Amended) The method of claim 11, further including:

terminating the first detector gate dither; and

performing a second detector gate scan[;].

~~13~~ 14. (Presently Amended) A method of performing photon detector autocalibration in quantum key distribution (QKD) system having a single-photon detector coupled to a controller, the method comprising:

performing a detector gate scan to establish an optimum arrival time of a detector gate pulse that corresponds with a maximum number of photon counts from a the single-photon detector ~~in the QKD system~~;

terminating the detector gate scan; and

performing a detector gate dither process by varying the arrival time of the detector gate pulse around the optimal value of the arrival time ~~in order~~ to provide minor adjustments to the arrival time to ensure that the single-photon detector produces a maximum number of photon counts.

15. (New) The method of claim 1, further including performing the detector gate scan and detector gate dithering multiple times during operation of the QKD system.

16. (New) The computer-readable medium of claim 6, wherein the method further includes performing the detector gate scan and detector gate dithering multiple times during operation of the QKD system.

17. (New) The computer-readable medium of claim 6, wherein the method further includes varying a detector gate pulse width W over a range of pulse widths to establish an optimal detector gate pulse width W_{MAX}.

18. (New) The method of claim 7, further including varying a detector gate pulse width W over a range of pulse widths to establish an optimal detector gate pulse width W_{MAX}.

19. (New) The method of claim 12, further including varying a detector gate pulse width W over a range of pulse widths to establish an optimal detector gate pulse width W_{MAX}.

20. (New) The method of claim 14, further including varying a detector gate pulse width W over a range of pulse widths to establish an optimal detector gate pulse width W_{MAX}.